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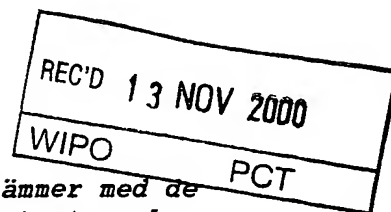
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(21) *Patentansökningsnummer*   *9903447-2*
      Patent application number

(86) *Ingivningsdatum*   *1999-09-23*
      Date of filing

Stockholm, 2000-10-31

För Patent- och registreringsverket
For the Patent- and Registration Office

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Iprobe

®

1. Scope of document

This document will describe a system for measurement, retrieval, and compilation of bill through to actual billing and payment of the achieved bill from an IPP (Internet Payment Provider). The system requires some new, proprietary technology on the flow measuring side, i.e. a device for measurement of the amount of electricity passing a given point, controllable over the power network. The working name for this invention is "Iprobe".

2. Components

2.1. Measuring device

The measuring device to be used in this system (Iprobe) is based on a Microcore and the command structure is simplified command structure with commands for reset, license, retrieval of cumulative data, retrieval of momentary data with reset etc. The probe holds a permanent or variable IP as well as a MAC address (hardware address of the device). IP could be IP V.4 or later.

- The power for running the probe is picked up from the power-net by an inductive (primary) coil providing voltage.
- The power is only needed when measuring and communicating with host. Thus, data can only be communicated when there is a power flow in the cord as well as measuring the power.
- The power consumption is measured through the induction of the power from the same coil. The microprocessor is extrapolating a consumption figure by measuring the induced power, which will directly proportional to the power passing through the amount of power in the power line, and writing it to its internal memory.
- The data communications is made possible by the interaction of the primary power coil and a secondary inductive coil designed to induce data into the network. The primary coil is delivering induced power but with a overcharged ripple from a power net modem for IP calls and the secondary coil is replying the same way. The Microcore is handling the communication protocol and the measured and stored power figure in the EEPROM can be retrieved at any time by the host.
- The primary and secondary coil may be the same coil by using an internal input/output switch.
- In order to achieve enough power for the iprobe to reply over the power net, a capacitor is draining the constant power source. When the "iprobe" needs to reply, the extra power is used for a higher power induction to the coil.
- The device is built in polyester with circuit layers screen-printed and the silicon bonded with ACF in circuit layer. The copper circuits are acting as coil and will be used as inducers and probes.

2.2. Local Network control

In some cases, a local server has to be implemented to serve as router and MUX. This is driven by the local power-net solution and the number of subscribers to be handled.

2.3. Network connection on host side

The host server is connected to the power-net by a power-net modem supporting TCP/IP v.4 or later.

2.4. Host

The host application server keeps track on IP and MAC addresses and ties this to the account of the subscribers. The application will also keep track the measurement commands, the time span between data collection and the compilation of the bill.

2.5. Bill compiler in host

The server will compile the bills. It will connect a number of measurements from certain device to a predefined tariff and then add information of the account customer (subscriber). This gives the full information to create a record and, hence, a bill to be sent to the customer in any convenient way.
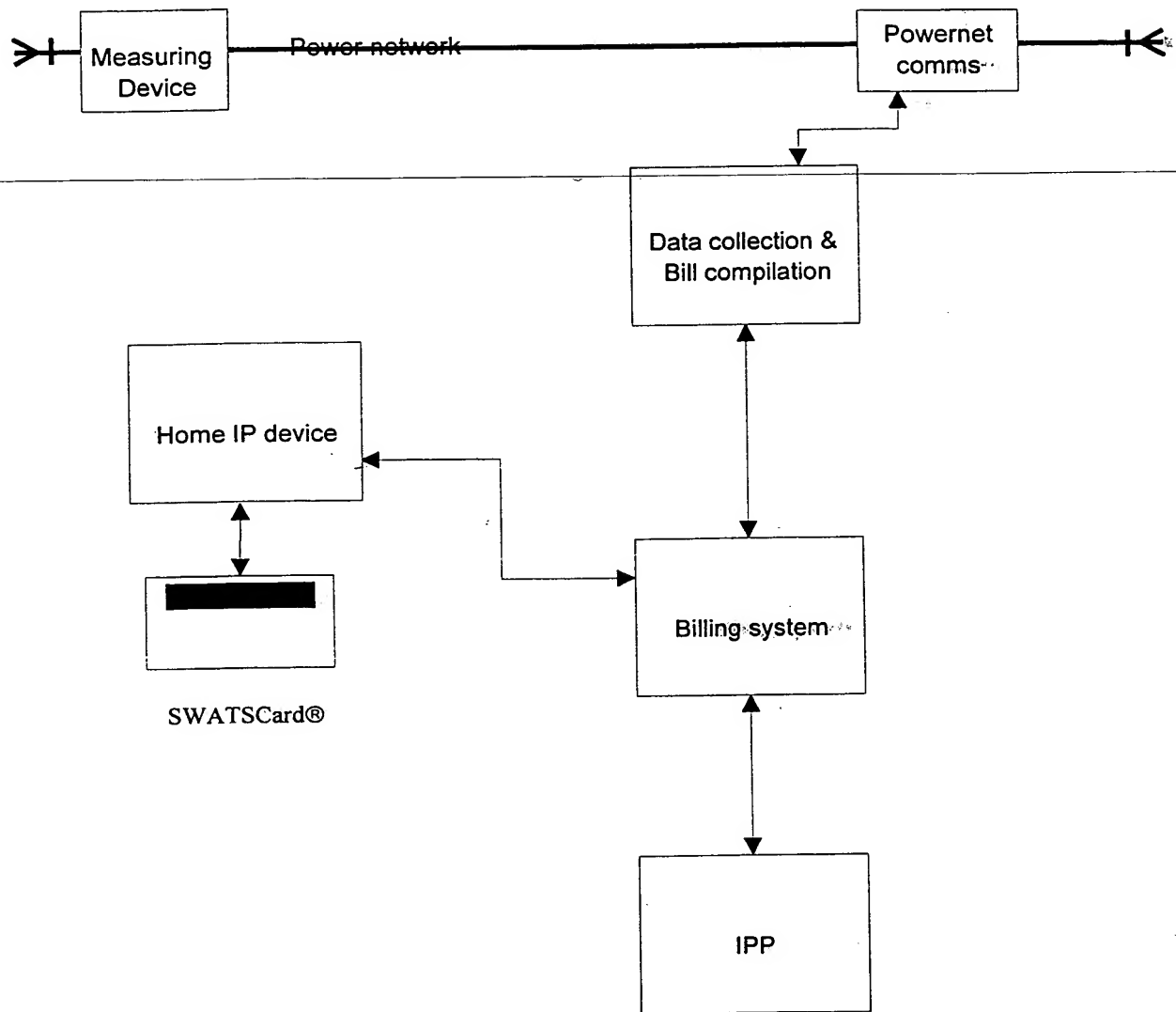
2.6. Payment service

As the bill contains all information about the customer and the content of the bill to be paid for, in an electronic format, it is very well suited to be sent directly a billing service. The billing service will let the subscriber view the account and the bill over the web and also let him select a good way to settle it.
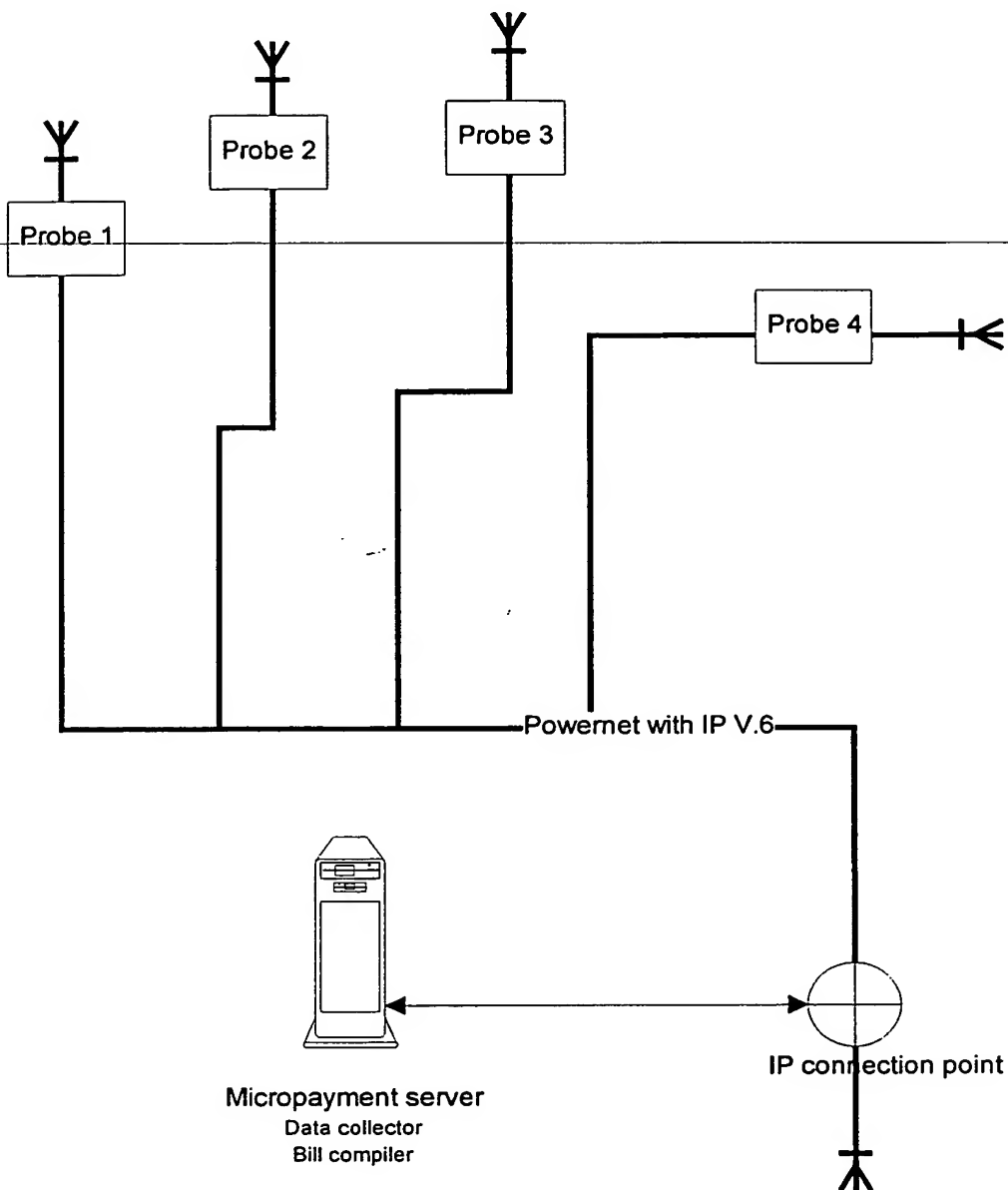
2.7. Customer information

The billing and payment service may let the customer get access to the status of the bill and the ways to pay it over the Internet network. One very good way to this is through the set top box Home Pilot. Furthermore, the box has a smartcard interface, which makes it possible to view the receipt and the status of the electricity consumption in the display of the SWATSCard®. This complete package will make the need for any mailings to the customer extinct. It will also give the provider of Electricity power the possibility to have a diversified tariff, i.g. set the price on power on a daily, hourly or, even, minute basis.

3. Figures and charts

3.1. Global overview

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>|—[Measuring Device]——Power network——[Powernet comms]——|<
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Measuring Device — Power network — Powernet comms

Data collection & Bill compilation

Home IP device

SWATSCard®

Billing system

IPP

3.2. Local overview "iprob "

Probe 2

Probe 3

Probe 1

Probe 4

Powernet with IP V.6

Micropayment server
Data collector
Bill compiler

IP connection point

3.3. Measuring device detail for "iprobe"

Powernet

Inductive power drain

Microcore

Inductive data inducer

E2PR OM

Power flow measurement

Inductive data collector